MELAG

Operating instructions for MELAG Autoclaves

Type 15

Type 17

Type 23

Type 26

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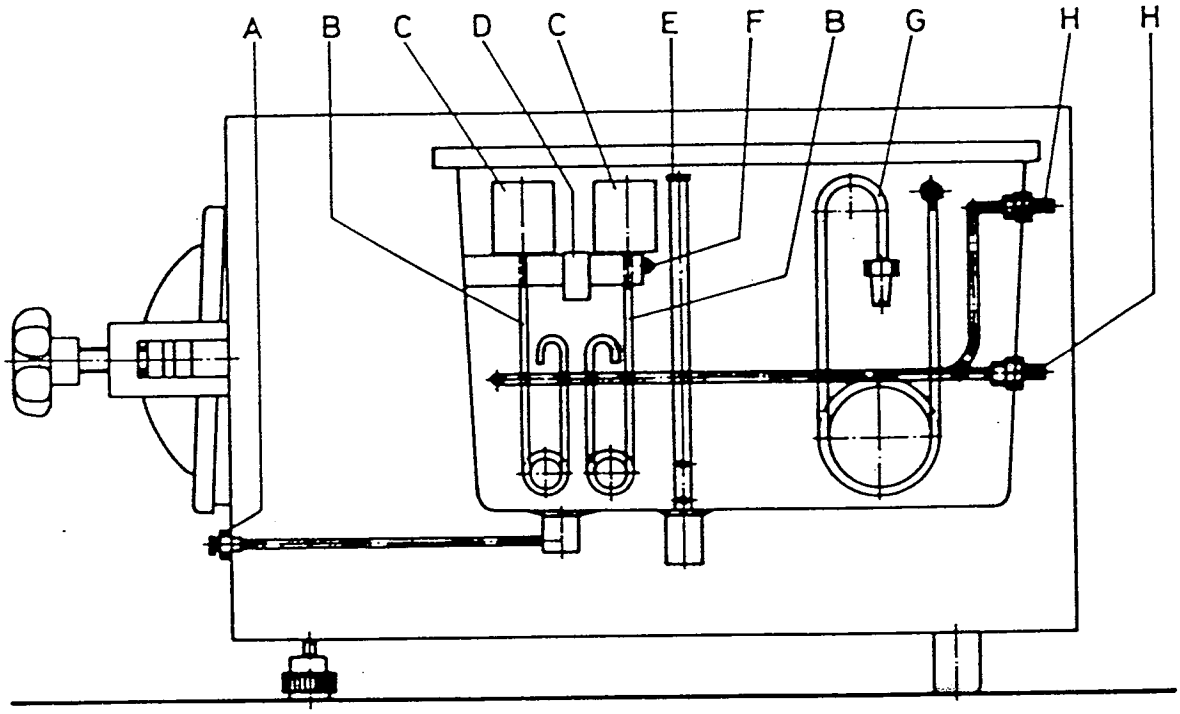
Type 15		Type 17	
Sterilization chamber:	15 dia. x 38 cm	Sterilization chamber:	17 dia. x 42 cm
Capacity	: 3 kg	Capacity	: 3 kg
Rating	: 1400 W 220 V AC	Rating	: 1400 W 220 V AC
Type 23		**Type 26**	
Sterilization chamber:	23 dia. x 45 cm	Sterilization chamber:	23 dia. x 45 cm
Capacity	: 6 kg	Capcity	: 6 kg
Rating	: 2200 W 220 V AC	Rating	: 3300 W 220 V AC

NOTE: These appliances are not intended for operation under conditions where there is a risk of explosion.

NOTE: The door closure spindle must always be well lubricated.

Note: "bar": The zero point of the pressure gauge used in the autoclave corresponds to atmospheric pressurre in accordance with DIN 16063. The indication 3 bar (previously 3 atmospheres gauge) thus shows a positive pressure of 3kp/cm^2.



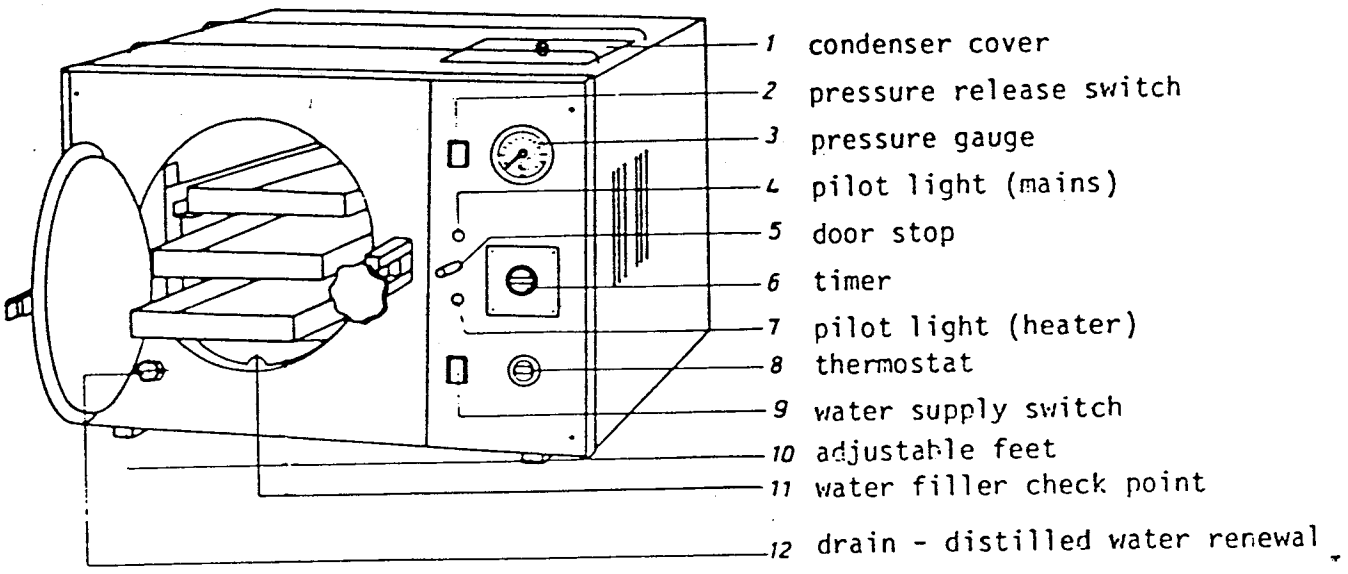
A condenser drain
B cooling coil spring safety valve
C spring safety valve
D water level mark "MAX"
E dirt filter
F flow nozzle
G cooling coil pressure release
H additional codenser cooling by water mains (only type 26)

1. Filling codenser before using

Remove cover (1) from appliance housing and condenser cover underneath this. Check that dirt filter (E) fits tightly in condenser. Experience has shown that dirt introduced into the autoclave with the material for sterilization collects in the condenser. The object of the filter (E) is to prevent particles of dirt from penetrating into the water filler solenoid valve.

Fill the condenser (which is also the water reservoir) with about 4 litres of distilled water. Check that the water does not go above the water level mark "MAX" (D), because the flow nozzle (F) in the valve block must be free of water.

To ensure that the steam is condensed and to avoid trouble from steam and increased distilled water consumption, the cooling coils of the safety valves (B) and of the pressure release (G) in the condenser should be covered by water, at least in respect of their bottom part. Used distilled water should therefore be replenished in good time.



2. For each sterilization

Pressure release switch (2) must be at "0".

Set red pointer of pressure gauge (3) to "0".

Set thermostat (8) to 1 bar = red point or 3 bar = black point, according to type of material for sterilization. 1 bar = 120°C for rubber, textiles etc., 3 bar = 143°C for metal, glass etc.

Place material for sterilization loosely on trays etc. and insert into chamber.

Set water supply switch (9) to "I". When the water is visible at the check point (11) reset switch (9) to "0".

Screw door shut.

Set timer (6) to red marking = 1 bar or black marking = 3 bar. The current is now switched on and the pilot lights (4) and (7) will illuminate. The thermostat controls the temperature and pressure via the heater; the white pilot light (7) will light and go out accordingly.

When the time to which the timer (6) has been set has elapsed, the current is automatically switched off and the two pilot lights (4) and (7) go out.

The pressure may be left to fall to zero ("0") automatically, or the pressure may be released immediately by setting the pressure release switch (2) to "I".

Do not open the door until the pointer of the pressure gauge (3) is back to "0".

Sterilization control

The red pointer on the pressure gauge (3) records the maximum pressure reached during sterilization and must correspond to the setting of the thermostat (8).

3. Horizontal position (when first used or when location is changed).

All MELAG autoclaves have direct water filling. This convenient system requires that the appliance must be placed horizontally. Therefore a graduated test beaker is supplied with each autoclave for its horizontal adjustment. The autoclaves are in a horizontal position if the following amounts of distilled water have been introduced into the chamber and the water is visible at the check point (11):

Type 15	:	220 cc
Type 17	:	230 cc
Type 23/26	:	280 cc

The adjustable front feet (10) can be set to a higher or lower position to achieve this where necessary.

The reason for the necessity of placement:
The boiler is installed in the autoclave so as to be inclined rearwardly at a specific angle, so that the distilled water is not visible at the check point (11) until the required quantity has flowed into the boiler.

If the autoclave is placed sloping forwards, the distilled water will be visible at the check point at the front of the boiler, even when an inadequate amount has flowed into the boiler. Cosequently, too little distilled water is available in the boiler for pressure generation and the pressure of 3 bar will not be reached or else the pressure of 1 bar cannot maintain the required 2o minute period of action.

If the autoclave is placed sloping rearwardly, the distilled water will not be visible at the check point until more water has flowed into the boiler than is necessary. The distilled water not consumed during sterilization will then stay in the boiler, and this is detrimental to the autoclave operation.

4. Total operating time (charge time)

Operating time for types 15/17/23 : 20 minutes at 3 bar, 45 minutes at 1 bar.
Operating time for type 26 : 15 minutes at 3 bar, 45 minutes at 1 bar.

When the timer (6) has been set to the marking for 1 bar (red) or 3 bar (black), operation takes place completely automatically for the period until the current is disconnected and the pressure is released, without any further manual operation being necessary.

The total operating time comprises the time to heat the chamber, the time for all air to be vented from the load and to achieve the initial temperature rise. Sterilization-time comprises equalisation of chamber temperature, killing time plus a safety allowance.

The operating times indicated must always be observed, irrespective of whether the appliance is cold or hot, to ensure that the boiler is vented as is necessary for sterilization, so that there is only saturated steam available for sterilization.

5. Careful cleaning of material for sterilization

Instruments and syringes are often cleaned with chemical cleaning agents or placed in disinfectants after use. These agents are frequently so corrosive that fittings and the surface of the boiler of the autoclave are attacked and may be destroyed. These cleaning agents must therefore be carefully rinsed off from the material under running water before sterilization.

Despite thorough rinsing, corrosive cleaning agents may remain in cracks and fissures in the material for sterilization and thus enter the autoclave. The autoclave boiler must therefore be thoroughly cleaned relatively frequently with a sponge or soft cloth. The tray guide frame should be pressed together slightly at the top on either side and withdrawn for this purpose.

6. Use of distilled water

The use of distilled water is necessary for steam sterilization because of the following:

a) Lime deposits in the steam pipes, valves and flow nozzle may impair the operation of the autoclave and:

b) The extent to which the instruments become stained depends on the quality of the medium used for steam generation.

6.1 How much distilled water is used for one sterilization ?

The amount of distilled water in the reservoir decreases, for each sterilization, by the quantity of steam which is not completely re-condensed. The loss depends on various factors:

a) The intervals of time between sterilization. If the distilled water in the conder has already been heated up by sterilization being carried out without any intervals between, the steam flowing out of the boiler condenses only inadequately and some escapes from the condenser.

b) If the distilled water has not been replenished for a long time and if the water level in the condenser has dropped to an extent such that the cooling coils are no longer covered, the outflowing steam is again not completely condensed and escapes.

6.2 When should the distilled water be renewed ?

Renewal of the distilled water in the condenser depends on how well the instruments have been cleaned before sterilization.

The distilled water must be regularly checked for cleanliness. If it is dirty and cloudy, a surface film will form; or if the bottom and walls of the condenser have filmed over, the distilled water must definitely be renewed and the condenser cleane

6.3 Condenser emptying

The drain (12) for emptying the condenser is located at the left-hand side of the front panel. The dirty distilled water can be drained off into a container (using a funnel if necessary) after the closure screw has been opened by counter-clockwise rotation.

Note: The dirt filter (E) must never be removed from the condenser base even during cleaning of the condenser.

Re-close the drain (12) and fill condenser with about 4 litres of fresh distilled water as far as the mark "MAX" (D).

7. Removal of dry material

To ensure that the material withdrawn is always completely dry, open the door immediately after the pressure has dropped and allow the thermal capacity of the boiler to dry the material. The pressure drop may if necessary be accelerated by operation of the pressure release switch (2).

If the boiler is already cold (e.g. opening after several hours), the timer can be set appropriately to enable heating to be carried out for some minutes for drying with the door ajar.

In practice it has been found advantageous (when loading) to place a sheet of filter or crepe paper on the floor of the tray and then another sheet over the material for sterilization.

Impregnated cellulose or muslin should not be used for the purpose, since the steam can dissolve substances which may be deposited in the form of spots and stains on th material for sterilization.

8. Discoloration of the chamber

The autoclave chamber are made from copper and nickelplated on the inside. In the course of time, this nickel coating assumes a yellowbrown colour due to the intensive heat. It becomes slightly porous particularly where the temperature influence is at the maximum due to the heater bearing against the outside of the chamber. This is the case at the bottom rear end of the chamber. This is not therefore rusting, but a slight porosity with corresponding discoloration of the nickel coating.

The pore formation is facilitated if there is an electrolytic process during sterilization. This increases if the distilled water, which is not of itself conductive, is contaminated by defectively cleaned material for sterilization. Through cleaning is therefore essential and the chamber must be regularly wiped out clean.

9. Rusting = external rust

All components coming into contact with water or steam are made from non-rusting materials: the condenser, pipelines, frame, trays and sterilization boxes are made from 18/8 stainless steel, chromium-plated or nickel-plated brass, and copper. No rusting can therefore occur due to the appliance itself.

Any rusting is "external rust". This originates from instruments or other metal articles which do not consist of stainless steel, but standard steel, and the electroplating of which has become defective. A single rust-secreting instrument is frequently sufficient to cause external rust to form on the other instruments or in the autoclave, because this external rust is deposited on other instruments or parts of the autoclave in the form of a thick film and causes corrosion. The boiler must therefore be regularly wiped out in order to avoid any external rust from being deposited. External rust can be removed with fine abrasives which do not contain chlorine or metal cleaning pastes (e.g. of the kind used for cleaning chromium plating). Do not use steel wool or steel wire brushes ! To clean the boiler, press the top of the tray guide frame slightly on both sides and pull it forwards out of the boiler.

1o. Sterilization frequency

Sterilization can be carried out some 8 to 10 times per day with the MELAG autoclaves. This large number is rendered possible by the MELAG system with which only a relatively small quantity of distilled water evaporates per sterilization and has to be re-condensed.

The short operating time enables two sterilizations to be carried out in 1 hour. If sterilization is carried out more than 2 or 3 times in succession without an interval and with the pressure release valve (2) being operated, the water in the condenser may become too hot and the outflowing steam is not fully condensed on further sterilizations. The result may be steam escaping from the condenser. This does not affect the sterilization results, which are determined only by the sterilization pressure to which the autoclave is set and complete expiry of the operating time.

Type 26: Since this model has a faster operating cycle, the condenser water may become too hot for effective cooling if the autoclave is in continuous use. The condenser can, however, be supplied with a cooling system (H) which can be connect to a supply of cold running water.

11. Fault finding

11.1 Current not switched off automatically by timer (6) when time expires

a) If the timer is just catching, e.g. if it has not been used for a long time, wind the timer up a few times and reset it to position "0" by turning it counter-clockwise.

b) In the event of a fault on the clock, obtain replacement clock from dealer, ensuring that appliance type and works number are indicated.

c) Timer replacement.
Remove mains plug. Release grub screw from clock knob and remove knob. Pull black timer mask away from the large black instrument panel by releasing the four Phillips screws. Remove timer from black timer mask by releasing two screws. Remove cable and sockets from the flat pins on the clock and fit them in the same way on the replacement clock flat pins. Fit the replacement clock and connect to mains.

11.2 Pressure to which thermostat (8) set not reached

The MELAG autoclaves are calibrated with the maximum charge. If considerably less material is used, move thermostat knob somewhat to the left while if more is used move it somewhat to the right.

a) Check whether pressure release switch (2) is on "0".

b) Check horizontal position (see Section 3, page 4)

c) Solenoid valves (2 and 9) leaking.

The supply of distilled water from the condenser and the pressure release pipe are opened by means of solenoid valves, which are closed if there is no current

Dirt reaching the boiler with the material for sterilization may impair the closing of one of the solenoid valves. When the autoclave is in operation, steam will then flow under pressure into the condenser, either through the dirt filter (E) if the water supply valve (9) does not close, or through the cooling coil (G) if the pressure release valve (2) does not close. To clean the solenoid valve, it should be repeatedly opened and closed by actuating the appropriate luminous switch, with the autoclave under pressure, so that t dirt can be blown out by the pressure.

d) Thermostat knob displacement (8)

During manufacture in the works, the thermostat knob is fixed on the thermost spindle by means of a screw and conical clamp after calibration.

If the knob is turned beyond its stop by the application of pressure by a mistake when the appliance is unpacked or subsequently, e.g. on cleaning, or if the screw has loosened in the conical clamp, the knob will slip on the thermostat spindle. Consequently, the pressure in the interior (read off on the pressure gauge (3)) will deviate from the value to which the thermostat scale is adjusted.

Correction is possible by turning the thermostat knob either clockwise, to give a higher temperature, or counter-clockwise to give a lower temperature. An appropriate mark can then be temporarily made on the scale.

Correct re-adjustment can be carried out as follows:

To remove knob, prise cap out forwards by means of a screwdriver, release exposed screw and pull off knob.

Place normal quantity of material for sterilization in appliance when cold. Operate timer and adjust thermostat spindle so that the pressure gauge pointer rises to 2.5 - 3 bar. This pressure is reached when the heater switches off for the first time at 2.3 - 2.5 bar (this is indicated by the white pilot light (7) going out).

On completion of sterilization, fit thermostat knob on spindle so that the white line points to the black point (3 bar). Carefully tighten knob with screwdriver, preferably holding knob with left hand to ensure that it does not shift on spindle.

Allow appliance to cool and operate at 1 bar. When pressure reaches 0.5 - 0.6 bar, turn control knob counter-clockwise until thermostat switches off heater; white light (7) must go out. The appliance will then heat to about 1 bar. Check that the pressure fluctuates between 1.0 and 1.4 bar, within narrower limits if necessary. If the pressure drops below 1 bar, turn knob clockwise slightly while if it rises to more than 1.4 bar move it counter-clockwise. When sterilization is concluded, remark thermostat knob pointer position on scale with red point and remove previous marking.

11.3 Appliance does not heat

a) If the red light (4) which shows whether the appliance is receiving power is not alight, check power supply lead, plug socket and fuse.

b) If the red lamp (4) is alight but not the white light (7), check thermostat knob position, see Section 11.2 d above.